VANCOUVER ISLAND
UNIVERSITY

Math 101 Practice Test 2 – Mar 2 2011

name (printed)	*student number*

Instructions:

1. There are **7 pages** (including this cover page) in the test. You will be given **75 minutes** to write the test. Justify every answer, and clearly show your work. Unsupported answers will receive no credit. Read over the test before you begin.

2. You may use a single letter-size "cheat sheet" containing formulae and numerical values. Your cheat sheet must not contain text, definitions or examples. The instructor will have the final decision on what is or is not appropriate for the cheat sheet. Hand in your cheat sheet along with your completed test. **To be considered for grading, your test must include your cheat sheet.**

3. Other than the cheat sheet noted above, no notes or books are to be used during the test. The last page is for scrap work. Put your name on the scrap paper and return it along with your completed test.

4. A basic scientific non-programmable, non-graphing calculator is permitted, however calculators may not be shared.

5. At the end of the test you will be given the instruction to stop writing. **Continuing to write after this instruction is cheating**.

6. **Academic dishonesty:** Exposing your paper to another student, copying material from another student, or representing your work as that of another student constitutes academic dishonesty. Cases of academic dishonesty may lead to a zero grade in the test, a zero grade in the course, and other measures, such as suspension from this university.

question	value	score
1	10	
2	10	
3	10	
4	10	
5	10	
Total	50	

Question 1:

(a)[5] Determine $\int x \arccos x \, dx$

(b)[5] Evaluate $\int_1^\infty \frac{1}{x^3 + 4x^2} \, dx$

Question 2:

(a)[5] Determine $\int \sec^5 x \tan x \, dx$

(b)[5] Determine $\int \frac{x+1}{\sqrt{9-x^2}} \, dx$

Question 3:

(a)[4] Let S be the region in the first quadrant that lies between the line $y = 3$ and the curve $y = \sqrt{1 + x^3}$. Use Simpson's rule with $n = 4$ to approximate the area of S.

(b)[3] The function $f(x) = xe^x$ has n^{th} derivative $f^{(n)}(x) = (x+n)e^x$. If using the midpoint rule to approximate $\int_0^2 xe^x\,dx$, how many subintervals are required to ensure that the approximation is accurate to within 0.01?

(c)[3] If using the Simpson's rule to approximate $\int_0^2 xe^x\,dx$, how many subintervals are required to ensure that the approximation is accurate to within 0.01?

Question 4:

(a)[5] Determine with proper justification whether $\int_1^\infty \frac{x^2}{x^4 + e^x}\, dx$ converges or diverges.

(b)[5] Evaluate the improper integral $\int_0^1 \frac{\ln x}{\sqrt{x}}\, dx$. Show all steps including any required limits.

Question 5:

(a)[5] A sphere of radius r has volume $V = 4\pi r^3/3$. Derive this formula using integration.

(b)[2] The region bounded by $y = \sin x$, $y = \cos x$, $x = 0$ and $x = \pi/4$ is rotated about the line x-axis. Set up but do not evaluate the integral representing the volume of the resulting solid.

(b)[3] The region bounded by $y = \sin x$, $y = \cos x$, $x = 0$ and $x = \pi/4$ is rotated about the line $y = 2$. Set up but do not evaluate the integral representing the volume of the resulting solid.